



EFFECTS OF AIR POLLUTION ON HUMAN HEALTH

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ABSTRACT

Environmental pollution arises in various forms, such as like air pollution, water pollution, soil pollution, etc... Air pollution may be defined as the presence of one or more contaminants like dust, mist, smoke and colour in the atmosphere that are injurious to human beings, plants and animals. There are many substances in the air which may spoil health of Humans, plants, animals and reduce visibility (lifetime). These arise both from natural processes and human activity. Substances not naturally found in the air or at greater concentrations are in different locations from usual are referred to as 'pollutants'. The effect of air pollution includes breathing (respiratory system) problems, aggravation of existing respiratory and cardiovascular disease, and alteration in body defence systems against foreign materials, damage to lung tissue, carcinogenesis and premature death. A report from World Health Organization stats that 4.6 million people died every year due to direct Causes attributable to air pollution. Direct causes of air pollution related deaths include aggravated asthma, bronchitis, emphysema, lung and heart diseases, and respiratory allergies including STRESS."

KEY WORDS: Air Pollution, Spoil Health, Humans, Household, Naturally and Deaths.

INTRODUCTION:

Environmental pollution arises in various forms, such as like air pollution, water pollution, soil pollution, etc... Air pollution may be defined as the presence of one or more contaminants like dust, mist, smoke and colour in the atmosphere that are injurious to human beings, plants and animals. There are many substances in the air which may spoil health of Humans, plants, animals and reduce visibility (lifetime). These arise both from natural processes and human activity. Substances not naturally found in the air or at greater concentrations are in different locations from usual are referred to as 'pollutants'. Individual reactions to air pollutants depend on the type of pollutant a person is exposed to, the degree of exposure, the individual's health status and genetics. On hot, smoggy days increase their exposure to pollutants in the air. With increasing the use of motorized transport is also expected to continue increase in the coming years, potentially worsening air quality. Poor air quality in turn has been shown to have seriously adverse effects on public health.

Air pollution contributes substantially to premature mortality and disease burden globally, with a greater impact in low-income and middle-income countries than in high-income countries. India has one of the highest exposure levels to air pollution globally. The major components of air pollution are ambient particulate matter pollution, household air pollution, and to a smaller extent ozone in the troposphere, the lowest layer of atmosphere. In India, the major sources of ambient particulate matter pollution are coal burning for thermal power production, industry emissions, construction activity and brick kilns, transport vehicles, road dust, residential and commercial biomass burning, waste burning, agricultural stubble burning, and diesel generators.

Household air pollution is caused mainly by the residential burning of solid fuels for cooking and to some extent heating, the major types of which are wood, dung, agricultural residues, coal, and charcoal. Ground level ambient ozone is produced when nitrogen oxides and volatile organic compounds emitted from transport vehicles, power plants, factories, and other sources react in the presence of sunlight. Rapidly developing countries such as India face the dual challenge of exposures from both ambient and household air pollution. Existing evidence suggests that India, with a population of 1.38 billion people living across states at different levels of economic, social, and health development, has one of the highest air pollution levels in the world. Evidence also suggests that air pollution is a major risk factor for disease burden. We found several previous studies that have estimated subnational variations in ambient particulate matter and household air pollution exposure in India and their contribution to deaths from various causes. However, a comprehensive understanding of the variations between the states of India in the exposure to the major components of air pollution, the associated deaths and disease burden, and the impact on life expectancy is not available in a single standardised framework to inform relevant policy interventions commensurate with the situation in each state.

This study provides a comprehensive assessment of the exposure to air pollution and its impact on deaths, disease burden, and life expectancy in every state of India in 2017 using the unified Global Burden of Diseases, Injuries, and Risk Factors Study framework, which includes 359 diseases or injuries and 84 risk factors. Using improved GBD 2017 methods for air pollution. Our findings highlight that 77% of India's population was exposed to an annual population-

weighted mean PM_{2.5} greater than 40 µg/m³ in 2017, which is the level recommended by the National Ambient Air Quality Standards in India, and none of the Indian states met the WHO-recommended criteria of ambient particulate matter air quality of less than 10 µg/m³. Even with substantial increasing provision of clean cooking fuels in India, more than half of India's population was exposed to household air pollution from solid cooking fuels in 2017. We report that one out of every eight deaths in India in 2017 could be attributed to air pollution. This study shows that India has a higher proportion of global health loss due to air pollution than its proportion of the global population. The findings of this study suggest that the impact of air pollution on deaths and life expectancy in India might be lower than previously estimated, but this impact is still quite substantial.

The high level of air pollution in India is a major public health and development issue that has significant implications for planetary health. There are large variations between the states of India in exposure to ambient particulate matter pollution and household air pollution and the consequent health loss and deaths. Although control of air pollution is needed all over India, the heterogeneity between the states should be taken into account in designing policies and interventions consistent with the magnitude and sources of air pollution in each state. In addition to the existing interventions, concerted multisectoral efforts are needed related to power production, industry, transport, fuel use, urban planning, construction, and agriculture for controlling air pollution in India to mitigate its impact. Public and policy focus on the control of air pollution in India is increasing, which should be sustained to translate this positive trend into effective interventions.

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A report from World Health Organization stats that 4.6 million people died every year due to direct Causes attributable to air pollution. Direct causes of air pollution related deaths include aggravated asthma, bronchitis, emphysema, lung and heart diseases, and respiratory allergies including STRESS. "In 1984 Bhopal Disaster will be a worst short term civilian pollution crisis in India. Industrial vapours leaked from the Union Carbide factory, belonging to Union Carbide, Inc., U.S.A., killed more than 2,000 people outright and injured from 150,000 to 600,000 people, some 6,000 of whom would later died from their injuries".

India had a population of 1.38 billion in 2017 spread across 29 states and seven union territories, many of which are as large as some countries and are at varying levels of development, leading to a heterogeneous distribution of health risks and their impact. The India State-Level Disease Burden Initiative has reported the overall trends of diseases, injuries, and risk factors from 1990 to 2016 for every state of India as part of the Global Burden of Diseases, Injuries, and Risk Factors Study (GBD) 2016, and also detailed trends of some major non-communicable diseases and suicide. According to these findings, air pollution was the second largest risk factor contributing to disease burden in India after malnutrition in 2016, with an increasing trend in exposure to ambient particulate matter pollution and a decreasing trend in household air pollution.

REVIEW OF LITERATURE:

Review of related literature makes the investigator fully aware with the previous work that has been done. It also provides an opportunity of gaining insight into the method, measures, subject and approaches employed by the other.

Dutta et al., (2012) In addition, a limited number of population studies carried out in India corroborate the broader global evidence for the higher incidence of chronic non-communicable respiratory and cardiovascular diseases in India.

Pant et al., (2016) This makes the task of understanding the nature and distribution of nationwide population exposures much more difficult. Another important aspect relates to the spectrum of exposures. In India, exposure to locally strong sources such as biomass cooking, trash burning, street food carts, and small industries contribute to large spatial gradients in exposures that are poorly captured by outdoor ambient levels measured at central sites.

Garaga et al., (2018) The risk of exposure to air pollution occurs in both rural and urban populations, however, the routine monitoring of air quality, in India and many countries across the globe, is nearly exclusively confined to urban centers.

METHODOLOGY:

The method used in this paper is descriptive-evaluative method. The study is mainly review based. It is purely supported by secondary source of data, i.e. books, journals, papers and articles and internet.

OBJECTIVES:

- To Examine the root cause for air pollution,
- To assess the impact of air quality on the health of people,
- To suggest awareness nationwide for prevention, control or abatement of environmental pollution.

RESULT AND DISCUSSION:**Mortality outcomes:**

Ambient air pollution has been linked to increased mortality in children and adults. Sudden infant death syndrome, a leading cause of postneonatal mortality in India and other developed countries, has been associated with exposure to criteria air pollutants. In a systematic review of the literature on the association between ambient air pollution and infant mortality, Glinianaia et al observed a consistent and significant association between PM and postneonatal mortality due to respiratory causes, as well as sudden infant death syndrome. Other studies have reported a significant relationship between ambient air levels of criteria air pollutants and mortality in children younger than five years of age.

Adverse pregnancy outcomes:

Ambient levels of criteria air pollutants have been associated with adverse pregnancy outcomes, including premature birth, low birth weight, intrauterine growth retardation, abnormal birth length, abnormal head circumference and small size for gestational age. However, no specific trimester has been identified as the most vulnerable period of gestation during which air pollution might be most harmful to the fetus.

Currently, only one study has investigated the effects of ambient air pollution on birth defects. Ritz et al observed a significant association between prenatal exposure to carbon monoxide and cardiac ventricular septal defects, while O₃ was associated with an increased risk of aortic artery and valve defects, as well as pulmonary artery and valve defects.

Adverse respiratory health outcomes:

Exposure to ambient levels of criteria air pollutants has been associated with several acute and chronic adverse respiratory health effects in both asthmatic and nonasthmatic children, although asthmatic children have been shown to be more susceptible to the adverse health effects of ambient air pollution. Several studies have linked ambient air pollution to an increased prevalence of asthma symptoms, as well as an increased incidence and prevalence of childhood asthma, particularly among children who regularly engage in sporting activities and those with increased asthma medication use, increased asthma emergency department visits and increased hospitalization due to asthma. Other studies have documented an inverse relationship between exposure to criteria air pollutants and lung function in both asthmatic and nonasthmatic children. There is evidence suggesting that current levels of ambient air pollutants may cause deficits in lung function growth in children. Ambient air pollution has been associated with increased reporting of respiratory symptoms among nonasthmatic children, as well as increased respiratory hospital admissions and emergency department visits for children.

Altered immunity:

Exposure to ambient levels of criteria air pollutants has been shown to cause alteration in the immune system in children. Leonardi et al studied the impact of ambient air pollution on the immune system of school children between nine and 11 years of age in 17 cities in Europe and found that ambient air pollution may alter both cellular and humoral immunity in children. However, a study conducted in Chile by Ruiz et al found no association between ambient air pollution

and the humoral immune system in children. Emerging evidence from animal toxicological studies suggest that ambient air pollution may cause suppression of host immunity.

Other air pollutants:

Although the present article is restricted to the health effects of criteria air pollutants, there are many other toxic air pollutants regularly released into the air that have the potential to harm children. Studies are appearing in the literature identifying potential exposures and health effects. The effects of air pollutants on genetic material are being investigated. Further studies may lead to a better understanding of not only childhood disorders, but possibly adult ones too.

Causes of Air Pollution:

Some of the gases can seriously and adversely affect the health of the people and should be given due attention by the concerned authority. The below mentioned gases are mainly outdoor air pollutants but some of them can and do occur indoor depending on the circumstances of the sources.

- **Tobacco smoke:** Tobacco smoke generates a wide range of harmful chemicals and is a major cause for health illness, which known to cause for cancer, not only to the smoker it will affect passive smokers too. It is well-known that smoking affects the passive smoker (the person who is in the vicinity of a smoker and is not himself/herself a smoker) ranging from burning sensation in the eyes or nose, and throat irritation, to cancer, bronchitis, severe asthma, and a decrease in lung function.
- **Biological pollutants:** These are mostly allergens that can cause asthma, hay fever, and other allergic diseases.
- **Volatile organic compounds:** Volatile compounds can cause irritation of the eye, nose and throat. In severe cases there may be headaches, nausea, and loss of coordination. In the longer run, some of them are suspected to cause damage to the liver and other parts of the body.
- **Formaldehyde:** Exposure causes irritation to the eyes, nose and may cause allergies in some people.
- **Lead:** Prolonged exposure can cause damage to the nervous system, digestive problems, and in some cases cause cancer. It is especially hazardous to small children.
- **Radon:** A radioactive gas that can accumulate inside the house, it originates from the rocks and soil under the house and its level is dominated by the outdoor air and also to some extent the other gases being emitted indoors. Exposure to this gas increases the risk of lung cancer.
- **Ozone:** Exposure to this gas makes our eyes itch, burn, and it has also been associated with increase in respiratory disorders such as asthma. It lowers our resistance to colds and pneumonia.
- **Oxides of nitrogen:** This gas can make children susceptible to respiratory diseases in the winters.
- **Carbon monoxide:** CO (carbon monoxide) combines with hemoglobin to lessen the amount of oxygen that enters our blood through our lungs. The binding with other heme proteins causes changes in the function of the affected organs such as the brain and the cardiovascular system, and also the developing fetus. It can impair our concentration, slow our reflexes, and make us confused and sleepy.
- **Sulphur dioxide:** SO₂ (sulphur dioxide) in the air is caused due to the rise in combustion of fossil fuels. It can oxidize and form sulphuric acid mist. SO₂ in the air leads to diseases of the lung and other lung disorders such as wheezing and shortness of breath. Long-term effects are more difficult to ascertain as SO₂ exposure is often combined with that of SPM.
- **SPM (suspended particulate matter):** Suspended matter consists of dust, fumes, mist and smoke. The main chemical component of SPM that is of major concern is lead, others being nickel, arsenic, and those present in diesel exhaust. These particles when breathed in, lodge in our lung tissues and cause lung damage and respiratory problems.

Air pollution control Measures :

- **Plantation:** More and more trees must be planted everywhere. Environmental protection needs to be considered as an important domain for industrial and other developmental activities in India. The Green belt objective varies from country to country and region to region. The common objective is to protect natural environments such as like biodiversity etc, to improve air quality of the region, pollution control has to maintain micro climate of the region, and Green Belt Development is an important tool that aims at overall improvement in the environmental conditions of the region." GO GREEN LIVE CLEAN".

- **Alternative Sources of Energy:** Alternative energy is any energy source that is an alternative to (coal) fossil fuel. Such alternative energy Sources are basically a Renewable Energy.
- **Alternative Fuel to Transport Vehicles:** An alternative fuel for vehicle is that a vehicle runs on a fuel other than traditional petroleum fuels (petrol or Diesel fuel).
- **Shifting of Industries:** In order to maintain the city's ambience and pollution free environment in important and historic areas polluting industries should be modernized to acceptable limit of pollution or it must be shifted from residential areas to industrial areas.
- **Establishment of Automobile Traffic Control Areas:** Some roads should be reserved exclusively for automobile traffic. On the other hand, congested roads and lanes should be declared as automobile traffic control area. Heavy traffic location needs to be analyzed and smoke observer must be installed to avoid pollution.
- **Pollution Check of Vehicles:** Immediate action need from Government for a ban on old vehicles after 10 years. Pollution Test of vehicles should be checked seriously on regular basis.
- **Environmental Impact Assessment:** Environmental impact assessment should be carried out regularly to identify and evaluate the potential and harmful impacts of industries on environment.

CONCLUSIONS:

Significant morbidity and mortality in children is attributed to ambient air pollution at great economic cost to society. As our cities grow and our population increases, we need to be aware of air pollution and its effects on children. Further studies are needed in India to improve our understanding of air pollution on the health of children to aide policy-makers in decisions that relate to the sustainability of development. Consideration needs to be given to emerging science on non-regulated pollutants that may be affecting the health of children today and may also be endangering future generations by affecting genetic material.

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